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A species-based approach to transboundary marine conservation in the Caribbean region

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Abstract:

The basic theory of peace parks is applied to transboundary marine environments in this paper. Emphasizing connections across different scales, the ultimate goal of this paper is to resolve a specific ecological conflict: international conservation of migratory marine species in the Caribbean region. Migratory marine species like the green turtle (*Chelonia mydas*) create a unique dilemma for conservationists. Migratory species require diverse eco-regions for different stages of essential life processes. In the Caribbean region, these life processes occur regardless of political and economic boundaries, creating a predicament for marine conservation. Linking marine turtle harvest and conservation laws of the nations throughout the Caribbean region with a transboundary marine conservation zone may alleviate some of the difficulties marine turtle conservationists face. An extensive literature review of marine turtle conservation generated a potential solution to the issues that marine turtle conservationists face in the Caribbean region. A transboundary, species-based approach to marine conservation in the Caribbean region may be most effective in protecting migratory species like the green turtle.

Key terms: transboundary, scale, conservation, Caribbean, marine protected area, connectivity

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Paper Section	**Connection to Thesis**
Ecological Profile of the Green Turtle:	In order to carry out essential life processes, migratory marine species that occur across political and economic borders in the Caribbean .
Maritime Law:	Territorial seas and exclusive economic zones are overlapped in the small-island states of Caribbean region, resulting in disputes in terms of determining sovereignty over natural resources, like the green turtle, within these coastal waters.
Marine Turtle Harvest Laws:	The level of protection a marine turtle receives, in terms of harvesting, is country-specific. The disparate marine turtle harvest laws illustrate correspondingly varied economic situations of the countries of the Caribbean region.
Current Marine Turtle Conservation Efforts:	International conservation laws require supportive domestic legislation in order to be practically applied to sea turtle conservation in the Caribbean region. Connecting regional and international legislation is crucial in effective conservation strategies.
Marine Protected Areas:	For a migratory marine species like the green turtle, linking marine protected areas across political and economic boundaries is essential in preserving the species across its vast geographical habitat.
Regional Cooperation:	With credence in the Caribbean community and available resources, international organizations are the most logical facilitators of a transboundary conservation strategy in the Caribbean region.

The Influences of a Transboundary World

Ali argues in his edited volume, Peace Parks: Conservation and Conflict Resolution, that environmental factors can be an essential element in peace building and maintaining a peaceful coexistence across political, economic, and sociocultural boundaries. Ecosystems, natural resources, and endangered species do not conform to manmade boundaries. Instead, environmental issues are inherently and principally linked to ecological boundaries (Ali 2007). Ali contends that the desire for resource management or biological preservation can unite, rather than divide, people across borders. Environmental protection and management may be considered low politics in comparison with other, more immediate issues, but Ali argues transboundary conservation zones may facilitate conflict resolution (Ali 2007). Peace parks are versatile political vehicles that can address global conflicts and promote change. Peace parks can be developed to focus on many issues, including those often at the root of conflict: food, shelter, and energy security. According to Ali, peace parks offer nations in conflict a new way to envision a long-term goal of peace that promotes environmental, economic, political, and sociocultural stewardship and sustainability (Ali 2007).

Borders, as a social construct, are an integral part of human life. Yet no unifying theory of borders exists to date (Newman 2006). Borders reflect the studies of many issues ranging from territory, power distribution, sovereignty and ecological zones (Newman 2006). Traditionally, borders have functioned as physical barriers to inhibit movement (Newman 2006). The study of borders has transformed into an interdisciplinary examination of not only the borders themselves, but also the sociocultural, geographic, economic, and political implications that accompany borders and borderlands (Newman 2006). Peace parks can convert borders from barriers that reinforce differences to linkages that facilitate conflict resolution.

Conservation practices are highly influenced by many types of borders. Political, ecological, and economic borders affect the nature of a conservation strategy. The scale at which conservation measures are implemented is crucial to effectively protecting migratory marine species like the green turtle. Sea turtle conservation can only be fully understood if addressed at different sociopolitical and geographic scales (Campbell 2007). Migratory species are not contained by human-generated spatial boundaries like the exclusive economic zones and territorial seas (Campbell 2007). The case of the green turtle illustrates that ecological, political, and economic perspectives are inherently connected. Conservation measures cannot be successful without addressing ecological, political and economic concerns (Campbell 2007). This paper addresses regional and global political viewpoints, as well as economic perspectives and ecological information in order to provide a comprehensive assessment of marine turtle conservation practices in the Caribbean region.

Rather than facilitate political or economic conflict resolution, the focus of this paper is on how to resolve a specific ecological conflict. The basic theory of peace parks is applied to transboundary marine environments . Migratory marine species like the green turtle (*Chelonia mydas*) create a unique dilemma for conservationists. Migratory species require diverse eco-regions for different stages of essential life processes. In the Caribbean region, these life processes occur regardless of political and economic boundaries, creating a predicament for marine conservation. Linking marine turtle harvest and conservation laws of the nations throughout the Caribbean region with a transboundary marine conservation zone may alleviate

some of the difficulties marine turtle conservationists face. An extensive literature review of diverse perspectives of marine turtle conservation generated a potential solution to the issues that marine turtle conservationists face in the Caribbean region. A transboundary, species-based approach to marine conservation in the Caribbean region, as proposed in this paper, may be most effective in protecting a migratory species like the green turtle.

The first section gives an ecological profile of the green turtle, *Chelonia mydas*. The green turtle will act as an example of a migratory marine species threatened by overexploitation in the Caribbean region throughout this paper. The second section describes global maritime laws that affect the coastal and open waters in the Caribbean region. The third section describes current sea turtle conservation efforts in terms of global and regional policy. In addition, this section gives a general overview of marine protected areas (MPAs), a popular mode of marine biodiversity preservation. The final section of this paper addresses international cooperation in the Caribbean region as a vehicle to support sea turtle conservation in the region. The international community of the Caribbean region is an appropriate facilitator for implementing a transboundary marine conservation zone. The conclusion provides an assessment of the future of sea turtle conservation efforts in the Caribbean, proposing a transboundary marine protected area, supported by international and regional legislation, as a potential solution to the complex situation that marine turtle conservationists currently face.

The Green Turtle: *Chelonia mydas*

The ecological profile of the green turtle, *Chelonia mydas,* illustrates the challenges conservationists must overcome when creating and implementing conservation strategies for marine migratory species. The green turtle is highly migratory and requires distinct marine environments for different essential life processes (”Marine Turtles”). The green turtle is found in the taxonomic family of Cheloniidae, which comprises other marine turtles found in the Caribbean region (”Marine Turtles”; Wider Caribbean Sea Turtle Conservation Network).

Description:

The green turtle is the largest of the hard-shelled sea turtles, averaging between 300 and 400 pounds, with a carapace (shell) length averaging three to four feet ((”Marine Turtles”; Wider Caribbean Sea Turtle Conservation Network). *C. mydas* is characterized by a small head and smooth, heart-shaped shell that varies in color (Lagueux 2001). The head of the green turtle is distinctive; green turtles have only a single pair (rather than two pairs) of large scales above their eyes (Lagueux 2001).

Distribution and Range:

The green turtle occurs throughout the tropical and subtropical waters between the 30° North and 30° South latitudes (Wider Caribbean Sea Turtle Conservation Network). The range of green turtles is highly dependent upon ocean currents due to the pelagic nature of the juvenile stage (Wider Caribbean Sea Turtle Conservation Network). After hatching and leaving their natal nests, green turtle hatchlings are dispersed throughout the tropical and subtropical latitudes by ocean currents, spending several years developing in the open ocean (Lagueux 2001).

Life History:

The life history of the green turtle is complex. The life cycle of the green turtle occurs across disparate habitats between which turtles must migrate vast distances. The life cycle begins with the oceanic phase (”Marine Turtles”). Due to the extreme difficulty of tracking hatchlings, this stage is not well understood. Developing turtles then migrate to coastal zones to feed (Global Sea Turtle Network). When sexually mature, green turtles migrate to breeding zones (Global Sea Turtle Network). After mating, males return to the coastal feeding areas, while females migrate back to their natal beaches to nest (Global Sea Turtle Network). After nesting, females return to the coastal feeding areas. Figure (1) illustrates the life cycle of a green turtle, labeling each of the environments in which each stage occurs. Each stage of life occurs in a different marine environment, ranging from open-ocean to shallow coastal waters and beaches (The Wider Caribbean Sea Turtle Conservation Network).

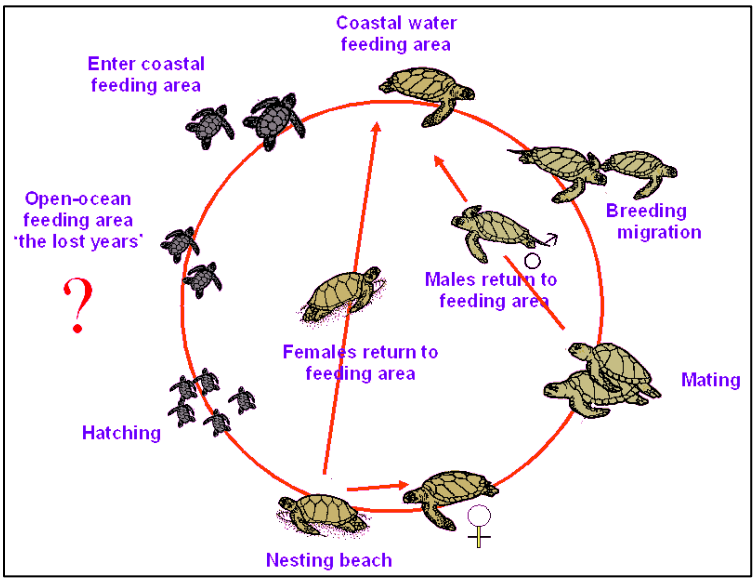
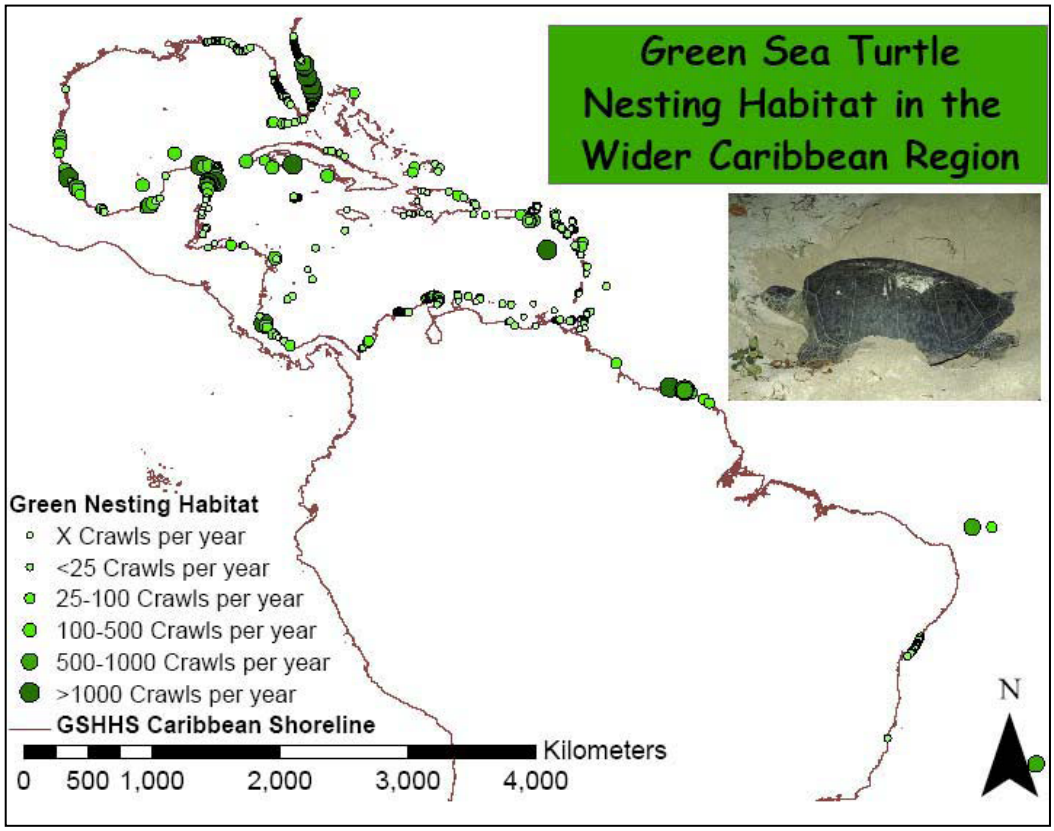


Figure (1). Life history of the green turtle. This diagram illustrates the complex life history of the green turtle (Global Sea Turtle Network).

Reproduction:

Green turtles are slow to reach sexual maturity, reproducing between ages twenty-seven to fifty years (Lagueux 2001). Genetic tracking has confirmed that female green turtles return to their natal beaches in order to form their own nests (”Marine Turtles”; Dow *et al*. 2007). Green turtles nest in two to four year intervals during various seasons according to location (”Marine Turtles”). Nests have an average of 115 eggs that incubate for approximately sixty days (Caribbean Conservation Corporation). Nesting occurs in eighty countries worldwide, including throughout the wider Caribbean region (International Union for Conerservation of Nature and Natural Resources and IUCN/SSC Marine Turtle Specialist Group 1995). The largest breeding colonies in the Caribbean are located on Tortuguero Beach in Costa Rica and Venezuela (Dow et al 2007). Map (1) shows the known nesting sites of *C. mydas* throughout the Caribbean region.



Map 1. Green turtle nesting habitat distribution in the wider Caribbean region. This map shows the known nesting sites in the Caribbean region for the green turtle. A "crawl" refers to the pattern that is left in the sand by a turtle landing and creating a nest. Map courtesy of Dow *et al.* 2007.

Case Study:

Suzie is an adult green turtle that was caught and tagged in the coastal waters of South Caicos, Turks and Caicos Islands, British West Indies in June of 2009 (Burns 2009; Global Sea Turtle Network). Sea turtle experts fitted her with a satellite tracking device that has transmitted data pertaining to her migratory habits for over a year (Burns 2009). In the first twenty-eight days of her migration, Suzie swam a total of 900 kilometers, crossing the borders between the British Virgin Islands, Turks and Caicos Islands, and Anguilla (Burns 2009). Suzie has traveled over 6,000 kilometers since first being tracked in early 2009 (Global Sea Turtle Network). She has crossed the political and economic boundaries of the following countries: Dominican Republic, Puerto Rico, US Virgin Islands, British Virgin Islands, St. Martins, St. Barts, Martinique, Curacao, Bonaire, Haiti, Turks and Caicos Islands, St. Kitts and Nevis, Saba, and The Bahamas. Suzie's tracking information confirms the highly migratory nature of marine turtles. The scale of a marine turtle's migratory route is immense, involving political and economic issues of scale as well as ecological.

Threats:

Marine turtles face a variety of threats, mostly due to human interference. The most direct interference is commercial and consumptive harvesting of turtles. Marine turtles are harvested for meat, carapaces (shells), eggs, oil, and other parts (Fleming 2001, "Marine Turtles"; Campbell 2002). Loss and degradation of nesting beaches and marine environments also threatens the already endangered/threatened turtle species (Fleming 2001). Marine turtles are often caught as by-catch in shrimp ("Marine Turtles "). Each of these threats is stimulated by human interference. These issues are regulated in the Caribbean region, but restrictions are country-specific. Gaps and inconsistencies occur throughout Caribbean legislation, increasing vulnerability of these species.

In addition, heavily exploited marine turtle populations are very slow to rebound due to their unique life histories (Fleming 2001). High natural mortality has been shown in eggs, hatchlings, and juveniles. Reproductive maturity is reached at least at age 15 (Fleming 2001). Juveniles are often exploited before they reach sexual maturity (Fleming 2001). In the Caribbean, in particular, size and carapace length quotas are either non-existent or not effectively enforced. These life history characteristics generate more challenges that sea turtle conservationists must address when creating a conservation management plan.

Sea turtle conservationists must confront the biological profile of the green turtle and the numerous threats to marine turtles when drafting conservation agendas. Throughout its life history, the green turtle requires diverse geographic regions to complete necessary elements of its life cycle (Lagueux 2001; "Marine Turtles"; Global Sea Turtle Network). In terms of the green turtle's general life cycle, development occurs in disparate locations, between which the turtles must migrate great distances. The reproductive portion of the turtles' life cycles requires migration to a variety of distinct marine regions, particularly for female turtles ("Marine Turtles"; Global Sea Turtle Network; Caribbean Sea Turtle Conservation Network). The case study of Suzie illustrates the species highly migratory nature, having traveled over 6,000 kilometers in little more than a year, crossing the boundaries of at least 15 countries in the Caribbean basin (Burns 2009). Sea turtles require across these political and economic boundaries throughout which they complete essential life processes. The varying threats that marine turtle species face pose even more challenges, especially when considering the difficulties of repopulating an exploited population of marine turtles. Sea turtle conservationists must address and incorporate this biological information when outlining and implementing conservation measures for this, and other, marine species.

Maritime Law

Global maritime law plays an essential role in determining political and economic marine boundaries. Two basic elements of maritime law, territorial seas and exclusive economic zones, are outlined in this section. These zones border the coastlines of coastal states. These borders are vital in establishing rights to, and therefore protection of, the natural resources found within the boundaries.

Territorial Seas:

The concept of the territorial sea is a fundamental part of maritime law. The Convention on the Territorial Sea and the Contiguous Zone, drafted in 1958 in Geneva by the United Nations, states

that the sovereignty of a State includes not only its land territory and internal waters, but also a section of the sea adjacent to the State's coast (Convention on the Territorial Sea and the Contiguous Zone (1958)). A State's territorial sea is limited to a baseline, which is delineated by the low-water line along the coast, as determined by nautical charts recognized by the State in question (Convention on the Territorial Sea and the Contiguous Zone (1958)). These limits also apply to islands (Convention 1958). Article 12 of the Convention describes the protocol for the territorial seas of States that are adjacent or opposite each other: neither State may extend its territorial sea beyond the median line "every point of which is equidistant from the nearest points on the baselines from which the breadth of the territorial seas of each of the two States is measured" (Convention on the Territorial Sea and the Contiguous Zone (1958)). The United Nations Convention on the Law of the Sea also outlines the limits of territorial seas. According to Article 3 of Part II, each State's territorial sea must not exceed 12 nautical miles from the baseline, or low-water line ("Oceans and Law of the Sea").

Exclusive Economic Zone:

Part Five of the United Nations Convention on the Law of the Sea describes the Exclusive Economic Zone, another essential element of international maritime law (EEZ). This zone located directly beyond the territorial sea and may not extend beyond 200 nautical miles from the low-water line ("Oceans and Law of the Sea"). The coastal State has sovereign rights over living and non-living natural resources within the exclusive economic zone ("Oceans and Law of the Sea"). The coastal State may also explore other methods of exploitation of this zone, including harvesting energy from winds, currents, and waves (United Nations Convention on the Law of the Sea). Scientific research, building artificial islands, as well as preservation of the marine environment are also rights held by the coastal State within the exclusive economic zone. Image (1) illustrates a cross-section of the limits of the territorial seas and exclusive economic zones.

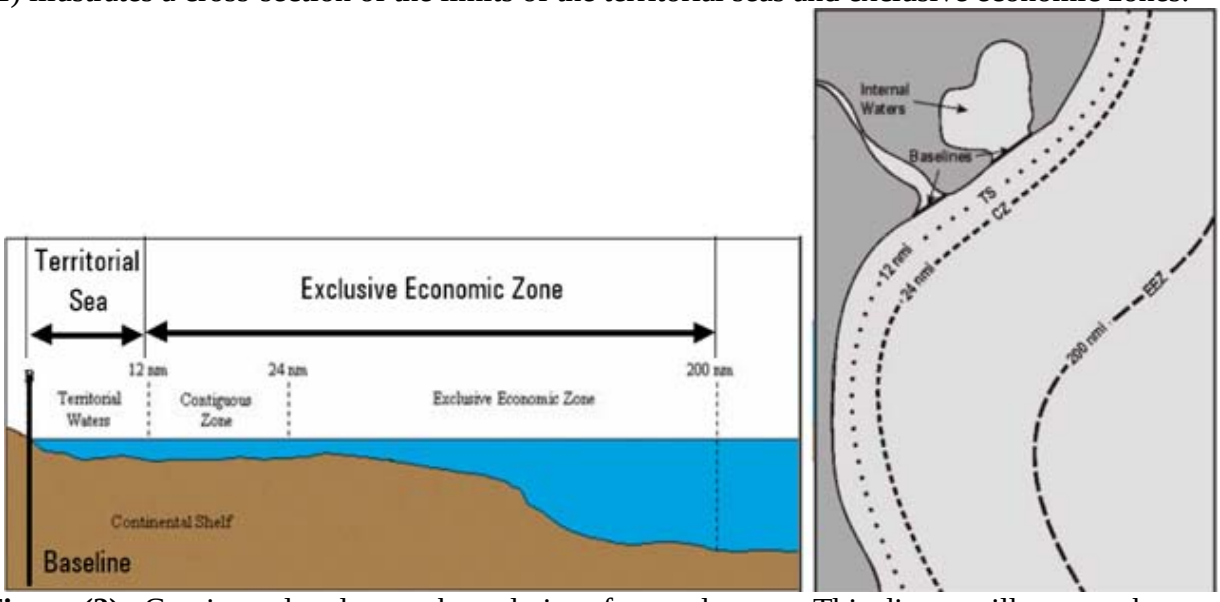


Figure (2). Continental and ocean boundaries of coastal states. This diagram illustrates the two basic components of maritime law explained above. Diagram courtesy of Land Information New Zealand.

Basic maritime law is vital in determining sovereignty over coastal marine environments. The rights to living and non-living natural resources are outlined by maritime law, inherently linking political boundaries with conservation strategies. In terms of scale, the fundamentals of

maritime law indicate that sea turtle migratory routes cross many political and ecological boundaries in the Caribbean region. Sea turtle conservationists must be aware of exclusive economic zones and territorial seas in order to determine which coastal state has rights to the natural resources within the coastal waters. Migratory resources, like the green turtle, pose a predicament for maritime law: green turtles are found throughout the marine environments which these political and economic boundaries are superimposed. The habitat for these species does not coincide with political boundaries. This issue is especially prevalent in the Caribbean region, which has 28 different island nations all with their own coastal boundaries. Conservationists in the Caribbean region must simultaneously address political issues like legally binding political and economic boundaries and biological evidence supporting that the habitat required to sustain a marine migratory species like the green turtle crosses these boundaries.

Marine Turtle Harvest Laws

Marine turtles are widely used throughout the Caribbean region (Campbell 2002). Marine turtle species are harvested for both commercial and consumptive uses (Campbell 2002). Marine turtles are harvested for their eggs, as well as shells, oils, and other body parts (Campbell 2002). Harvest laws vary widely throughout the Caribbean region (*Godley et al.* 2004). Table 1 illustrates the disparate nature of these harvest laws.

	Haiti	Turks and Caicos Islands	Cuba	Grenada
Complete protection	No	No	Yes*	No
Moratorium	No	No	NA	No
Prohibition(s) on take	Eggs, Nesting Females	Eggs, Nests, Nesting Females	Eggs, Nests, Nesting Females	Eggs, Nests, Nesting Females, Leatherback
Closed season	Yes	No	Yes	Yes
Minimum size limits	No	Yes	Yes	Yes
Maximum size limits	No	No	No	No
Annual quota	No	No	Yes	No
Permits/licenses required	Yes	No	Yes	Yes
Gear restrictions	No	No	Yes	Yes
Area closures (MPA, park, reserve)	No	Yes	Yes	No
Reports of exploitation/sale nationally	Yes	Yes	Yes	Yes
Reports of illegal trade internationally	No	Yes	No	Yes
Public awareness of laws	No	No	Yes	Yes
Recent prosecutions or penalties	No	No	Yes	No
Enforcement considered adequate	No	No	Yes	No
Penalties are an adequate deterrent	No	Unknown	Yes	Unknown

Table 1. Marine turtle harvest laws for Haiti, Turks and Caicos Islands, Cuba, and Grenada. Table adapted from Godley *et al*. 2004; Dow *et al* 2007.

The table demonstrates that there are no maximum size limits for turtle harvesting. The table also indicates that marine turtles are for sale nationally throughout the Caribbean. These two categories are the only categories within the table with equivalent outcomes for each Caribbean nation represented in the table.

As marine turtles cross different political boundaries in their migratory routes, levels of protection fluctuate. The turtles may be subject to very minimal legislative protection in the coastal waters of one country in of their migratory route, but receive maximum protection in different country's coastal waters. Conflicting harvest laws create more challenges for sea turtle conservationists. The international conservation laws currently in place in the Caribbean region are void without domestic legislation that enforces international stipulations. Marine turtle harvest laws must be harmonious throughout the region in order for the green turtle, and other marine turtles, to be conserved effectively. These disparate laws correspond to the diverse economic situations of each Caribbean country. Marine turtle harvest laws are not exempt from issues of scale. These laws must incorporate ecological, political and economic information in order to be effective. These laws must support international legislation that has already been implemented. Ecological information on the life history and vulnerability of the species must also be considered. Economic viewpoints must also be included in the creation of these laws, especially in terms of nations that depend heavily upon commercial sale of marine turtles.

Sea Turtle Conservation Mechanisms

The scale at which conservation measures are implemented is crucial to effectively protecting migratory marine species like the green turtle. Sea turtle conservation can only be fully understood if addressed at different sociopolitical and geographic scales (Campbell 2007). As stated above, both global legislation and ecological perspectives must be considered when drafting conservation strategies. Conservation measures cannot be successful without addressing ecological, political and economic concerns (Campbell 2007). This section describes the stipulations of legislation pertinent to sea turtle conservation in the Caribbean, beginning with generalized policies and ending with species-specific legislation that directly affects sea turtle conservation. This section also includes information on the development and implementation of a recently popular conservation mechanism: marine protected areas (MPAs).

International Sea Turtle Conservation Legislation in the Caribbean:

International Union for Conservation of Nature (IUCN) Red List of Threatened Species:

The International Union for Conservation of Nature (IUCN) Red List of Threatened Species evaluates flora and fauna to determine their global status as a species. The Red List assigns each species a grade that determines how important conservation measures will be to the species in question. There are seven grades that indicate a species global status: 1) LC: least concern, 2) NT: near threatened, 3) VU: vulnerable, 4) EN: endangered, 5) CR: critically endangered, 6) EW: extinct in the wild, and 7) EX: extinct (IUCN). According to the IUCN Red List of Threatened Species, the green turtle is considered endangered on a global level (IUCN). All marine turtle species, except for the Australian flatback, are listed as either endangered or vulnerable. The creation of this policy demonstrates that there is an international

acknowledgment of the importance and vulnerability of marine turtles. The Red List also reveals a global demand for conservation of these species.

Convention on International Trade of Wild Fauna and Flora (CITES):

The Convention on International Trade of Wild Fauna and Flora (CITES) was drafted in 1973 and put into force in 1975 ("Convention on International Trade in Endangered Wild Fauna and Flora"; Fleming 2001). CITES regulates the international trade of endangered or soon-to-be endangered species. Species are listed in three appendices that enforce different restrictions. The entire Cheloniidae family is listed among the 820 species listed under Appendix I (Fleming 2001). Appendix I prohibits all international commercial trade of marine turtles (including shells, meat, and other individual parts) among member nation-states of the Convention. Contracting Parties of CITES in the Caribbean region include Bermuda, British Virgin Islands, Cayman Islands, and Montserrat. Turks and Caicos and Anguilla are currently in the process of proposing similar domestic legislation. The Caribbean community's minimal participation in this international convention illustrates the region's limited support of marine turtle conservation, despite global recognition of the threatened status of these species.

Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region: The Cartagena Convention:

This convention is an extensive agreement among the wider Caribbean region to preserve, protect, manage, and develop the marine environment ("About the Cartagena Convention"). Adopted in 1983 and entered into force in 1986, this Convention is currently the only legally binding environmental treaty in the Caribbean region ("About the Cartagena Convention"; Fleming 2001; Godley *et al.*2004). All Contracting Parties must take "appropriate measures" to preserve rare or fragile ecosystems and the habitats of threatened or endangered species ("About the Cartagena Convention"). This Convention aims to facilitate national and regional management of the Caribbean region's coastal and marine resources (Godley *et al*. 2004). This convention is important because it is focused not only upon the general ecosystems of the Caribbean region, but also more specifically on the marine environment.

Protocol Concerning Specially Protected Areas and Wildlife:

The Protocol Concerning Specially Protected Areas and Wildlife (SPAW), adopted in 1990, is an appendix to the Cartagena Convention (SPAW, Fleming 2001). SPAW stipulates that signatories must have "regard to the special hydrographic, biotic, and ecological characteristics of the Wider Caribbean Region" and be "conscious of the grave threat posed by ill-conceived development options to the integrity of the marine and coastal environment of the Wider Caribbean Region (Protocol Concerning Specially Protected Areas and Wildlife). SPAW also emphasizes ecosystems connections throughout the Caribbean basin. The protocol asserts that the Wider Caribbean region has a responsibility to establish regional cooperation on environmental issues (Protocol Concerning Specially Protected Areas and Wildlife to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region). Contracting Parties must ensure that threatened and endangered species are protected, preserved, and sustainably managed (Protocol Concerning Specially Protected Areas and Wildlife).

SPAW stipulates that each Party to the Protocol must establish protected areas within the marine ecosystems, paying special attention to endangered and threatened species (Protocol Concerning Specially Protected Areas and Wildlife to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region). Protected areas must conserve, maintain, and restore marine and coastal ecosystems as well as endemic, endangered, or threatened species' habitats (Protocol Concerning Specially Protected Areas and Wildlife). Regulation and monitoring of any activities that may exacerbate a threatened species' status is required (Protocol Concerning Specially Protected Areas and Wildlife). The ultimate goal of SPAW is to act as a preventative policy, protecting other species from becoming endangered or threatened (Protocol Concerning Specially Protected Areas and Wildlife).

Inter-American Convention for the Protection and Conservation of Sea Turtles:

The Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC) is the only international treaty that is dedicated to marine turtles (Godley et al. 2004). Out of twenty-eight countries, this piece of legislation has been signed by twelve countries and ratified by only nine of those countries ("Inter-American Convention for the Protection and Conservation of Sea Turtles"). The IAC mandates that marine turtle habitat be protected, incidental catch of marine turtles by commercial fishing activities be minimized, and trade and harvest of turtles and turtle products be entirely prohibited (Godley *et al.* 2004). This convention indicates that the Caribbean region is actively pursuing policies that strictly regulate marine turtle harvest.

In terms of sea turtle conservation, these pieces of legislation are stepping stones. Each piece of legislation has drawbacks that, if not addressed in the future, may eclipse any positive elements. Criticisms focus on the lack of internal enforcement mechanism for signatories. Instead of establishing an infrastructure to support these conventions, contracting countries are expected to enforce "appropriate measures" to legitimize stipulations (Fleming 2001). Domestic legislation must accompany these international agreements. The Inter-American Convention for the Protection and Conservation of Sea Turtles is a species-specific and explicit set of guidelines. The severe restrictions on sea turtle harvest may prevent this treaty from being signed by the majority of the Caribbean community. The scales at which marine turtle conservation strategies are addressed are key predictors of future success. A transboundary marine protected area may offer marine turtle conservationists an opportunity to connect regional and international scales.

Marine Protected Areas

A global demand for marine conservation has led to the goal of preserving at least ten percent of the world's oceans in Marine Protected Areas (MPAs) by 2012 (Guarderas 2008). However, conservation measures have only recently been implemented in the ocean environment (Agardy 1994). The transient nature of marine environments corresponds to various challenges for conservationists (Agardy 1994). An ocean environment's ecological boundaries are constantly changing, forcing marine conservationists to generate more creative conservation strategies, like the marine protected area (MPA).

MPAs are a relatively new method of marine conservation and natural resource management in the Caribbean (Dixon 1994; Guarderas 2008). MPAs are widely acknowledged as an effective measure of preserving biodiversity (Dixon 1993). MPAs are variable in terms of restrictions within the boundaries of the protected area (Guarderas 2008). Some MPAs allow

natural resource extraction practices, while others are no-take zones that take stricter steps in marine conservation (Guarderas 2008).

As a new conservation method, debates over ideal sizes, restrictions, and methods are on-going. The debate over the size of MPAs is most relevant to this research. This debate is known as the Single Large Or Several Small (SLOSS) debate. Some experts advocate for Single Large MPAs that encompass the largest portions of the most marine ecosystems possible. Other experts believe that a network of Several Small MPAs is effective in terms of protecting as many types of marine environment as possible, as well as the most realistic and conceivable option. In any case, small, singular MPAs are not effective in preserving a relevant sample of marine ecosystems, especially in the variable Caribbean marine environment (Guarderas 2008).

Marine Protected Areas are a crucial building block of marine conservation in the Caribbean region. A total of 756 MPAs comprising over 3000 square kilometers of marine environment are currently in place throughout the Caribbean region (Guarderas 2008). However, the exclusive economic zones of each Caribbean nation can potentially provide approximately 20 million square kilometers of ocean available for environmentally protective policies (Guarderas 2008). With the exception of Haiti, Guyana, St. Barthelemy, and St. Martin, all other Caribbean countries had some type of MPA in place, ranging in levels of restriction (Guarderas 2008). These statistics demonstrate that the Caribbean region is not resistant to innovative conservation measures, but has not yet taken advantage of the vast regions available for MPA implementation. The current MPAs can be used as stepping-stones to facilitate a transboundary conservation network within the Caribbean basin.

Though linking the current marine protected areas in the Caribbean region to create a large network throughout the Caribbean basin is feasible, connections between these conservation zones will be useless without legislative support. International conservation legislation requires supportive domestic legislation to be effective. This paper argues that the current marine protected areas must be linked by common legislation as well as by ecological aspects. Creating and implementing an effective marine protected area in terms of marine turtle conservation requires addressing issues of regional scale.

Regional Cooperation

Transboundary marine conservation is most logically facilitated by international organizations. The Caribbean Community (CARICOM) and the Organization of Eastern Caribbean States (OECS) are two international organizations that focus on common regional issues within the Caribbean basin. These organizations evaluate regional challenges in the Caribbean region, including agriculture, implications of climate change, tourism, economic development, health care, and security ("Caribbean Community (CARICOM)"). These organizations have the resources and tools available to facilitate international conservation efforts. However, only recently has assessment of management and conservation strategies of the terrestrial and marine environment begun in the Caribbean. These organizations focus on higher political issues like economic and political stability. The Wider Caribbean Sea Turtle Conservation Network, on the other hand, is an international organization that has narrowed its focus to marine turtles in the Caribbean.

The Wider Caribbean Sea Turtle Conservation Network (WIDECAST) is an organization dedicated specifically to sea turtle conservation in the Caribbean. WIDECAST provides both ecological and political viewpoints on sea turtle conservation in the Caribbean. However, WIDECAST does not have the international recognition that CARICOM and OECS have. Members of CARICOM and OECS can collaborate with an organization like WIDECAST to begin implementing international conservation measures in the Caribbean region.

Marine conservation in the Caribbean region may be deemed "low politics" in comparison with the economic, political, and social strife that must be addressed first. Issues of political stability and economic development, crime and security, education, and access to healthcare are all issues posing a more immediate threat to these countries ("Caribbean Community (CARICOM)"). However, if ignored, environmental problems will persist and grow. Transboundary marine conservation can link countries with disparate laws and regulations. Uniting the Caribbean community by preserving specific marine species can facilitate more international cooperation in this region. Regional commitment to one shared objective can result in similar compromises in other, perhaps more fundamental, issues.

The Future of Marine Turtle Conservation:

Successful marine turtle conservation must connect across diverse scales. A comprehensive assessment of marine turtle conservation must address ecological, political, economic, and socio-cultural perspectives. Currently, marine turtle conservation strategies are focused upon just one of these positions. The future of marine turtle conservation must connect these approaches. This paper has shown that each standpoint is inherently linked to the next; conservation strategies that use aspects of all these perspectives will be most effective and efficient.

The ecological profile of the green turtle illustrates the geographical issues that sea turtle conservationists must address when creating conservation methods. The green turtle demonstrates that migratory marine species require vast and disparate geographical regions in order to carry out essential life processes. In the Caribbean basin, these migratory routes cross political and economic boundaries, as demonstrated by the maritime law section of this paper. A sea turtle's migratory route may cross many different countries' boundaries for territorial seas and exclusive economic zones. Each of these countries also has disparate laws on marine turtle harvesting. Connecting these laws throughout the Caribbean region may encourage more effective protection and conservation of these species. International conservation laws that have been implemented in the Caribbean region are dependent upon domestic legislation that links the stipulations of the global conservation laws to domestic mandates. The most logical way to implement these connections is via an international organization that has credence within the Caribbean community. Organizations like Caribbean Community (CARICOM) and Organization of Eastern Caribbean States (OECS) can facilitate international marine turtle conservation. This paper suggests a transboundary marine protected area that connects each country, supported by both domestic and international conservation legislation, as an alternative to the current conservation strategies in the Caribbean region.

Marine turtle conservation methods are currently insufficient in terms of connecting the issue across diverse scales. A transboundary protected area supported by international and regional legislation may be effective in protecting a migratory marine species like the green

turtle. At the very least, marine turtle conservation strategies must address information from different perspectives in order to be more inclusive.

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